The next-generation model that surpasses the CA-210

For high-speed, high-accuracy measurements of LED-backlit LCD TVs

Support for LED backlights

Display Color Analyzer CA-310

KONICA MINOLTA

Support for LED backlights
Enables high-accuracy adjustment of EL/LED-backlit LCD TV gamma/white balance to greatly improve efficiency.

White balance adjustment has advanced even further!
Our previous Display Color Analyzer CA-210 could adjust the white balance of LED-backlit LCD TVs to $\Delta xy=0.010$, but the new Display Color Analyzer CA-310 enables adjustment to $\Delta xy=0.003$ so colors are even more true, as can be seen below.

<table>
<thead>
<tr>
<th>CA-310 adjustment results</th>
<th>CA-210 adjustment results</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta xy=0.010$</td>
<td>$\Delta xy=0.003$</td>
</tr>
<tr>
<td>Target color</td>
<td>$\Delta xy=0.000$</td>
</tr>
<tr>
<td>$\Delta xy=0.003$</td>
<td>$\Delta xy=0.010$</td>
</tr>
</tbody>
</table>

Enables high-speed measurement of even extremely low luminances down to 0.005 cd/m²
Sensor noise reduction technology has been used to enable measurements even in the extremely low luminance region around 0.005 cd/m² at speeds as fast as 4 times per second. This allows the high-speed high-accuracy measurement essential for manufacturing high-grade displays. In addition, at luminances higher than 2.0 cd/m², 20 measurements per second are possible.

Reduces errors due to LED emission distribution variations to less than 1/3.
Variations in the emission distribution of LED backlights result in individual differences of about 10nm in peak intensity wavelength. If LED-backlit LCD TVs with such individual differences are adjusted using conventional color analyzers, color differences of close to 0.010 on the xy chromaticity diagram may occur. But the CA-310 has sensor sensitivities that more closely match the CIE 1931 color-matching functions, enabling the color difference in the same case to be reduced to around 0.003, suppressing errors to less than 1/3.

*Errors (differences from true values) for white LEDs with different peak wavelengths when measured using CA-310. User calibration to standard LED performed.*
PC Software for Color Analyzer
CA-SDK (Standard accessory)
Standard accessory SDK helps create software easily according to needs. Sample software is bundled; you can start data collection easily.

Example of White Balance Adjustment Software made by SDK

Required system
OS: Windows® XP, Vista, 7
Windows® and Excel® are a trademark of Microsoft Corporation in the USA and other countries.

Expandable up to 5 measuring probes. (Requires expansion board CA-B15)

Number of digits for luminance display increased, enabling display to 0.0001 cd/m².

Probes variations
This table is based on the most popular method for controlling emission intensity for each display type.
* Measurements of displays using certain control methods are not possible. For details of measurement compatibility, contact your nearest Konica Minolta representative.
Examples for which measurement is not possible:
- Displays which use PWM, etc. for control of emission intensity.
- Displays with backlights which emit intermittently.
- Displays which write black for each frame, etc.

System Diagram

Sample software (Standard)
Cal
CA-210 can be corrected in the matrix calibration method using Konica Minolta’s spectroradiometer CS-1000A.
Color
The measurement data of CA-210 can be acquired into the PC. Drift tests, LCD stability test and so on can be performed easily. The acquired data can be read with Excel® or other spreadsheet software.
Contrast
Multi-point measurement (5, 9, or 25 points) can be made for white uniformity and contrast measurement.
Gamma
R, G, B, and W gamma measurements for gradations of 16, 32, 64, 128, and 256 steps.

LED Universal Measuring Probe LED Flicker Measuring Probe

| CA-310 Probe |
|-----------------|-----------------|-----------------|-----------------|
| Ø27 Probe CA-P35 (5m) CA-P32 (2m) CA-PU55 (5m) | Ø10 Probe CA-P35 (5m) CA-P32 (2m) CA-PU55 (5m) | Ø27 Probe CA-P35 (5m) CA-P32 (2m) CA-PU55 (5m) | Ø10 Probe CA-P35 (5m) CA-P32 (2m) CA-PU55 (5m) |

| Applicability for different display types |
|-----------------|-----------------|-----------------|-----------------|
| Transmissive / semi-transmissive LCD | Active Matrix Driven | Passve Matrix Driven | Passive Matrix Driven |
| OLED | Active Matrix Driven | Passve Matrix Driven | Passive Matrix Driven |
| PDP | Active Matrix Driven | Passve Matrix Driven | Passive Matrix Driven |
| FED | Active Matrix Driven | Passve Matrix Driven | Passive Matrix Driven |
| Rear Screen Projector | LCD | Active Matrix Driven | Passve Matrix Driven |
| DLP | Active Matrix Driven | Passve Matrix Driven | Passive Matrix Driven |
| CRT | Active Matrix Driven | Passve Matrix Driven | Passive Matrix Driven |

○ Recommended
△ Measurement possible with restrictions, but probes marked with ○ are recommended
× Measurement not possible

(LED Flicker Measuring Probes are unsuitable for measurements of CRT.)
## Specifications

### Measurement area
- 50 to 60

### Acceptance angle
- ±5°

### Measurement distance
- 30 to 60 mm

### Display luminance range
- 0.000 to 1000 cd/m²
- 0.000 to 1000 cd/m²
- 0.000 to 1000 cd/m²

### Chromaticity Measurement range
- 0.0500 to 4.999 cd/m²
- 0.0050 to 0.0999 cd/m²
- 0.0050 to 0.0999 cd/m²

### Luminance Measurement range
- 0.0001 to 4.999 cd/m²
- 0.0001 to 0.0999 cd/m²
- 0.0001 to 0.0999 cd/m²

### Accuracy (for white)*
- ±0.5 dB (Flicker frequency: 30 Hz AC/DC 1.2% (-50 dB sine wave))
- ±0.5 dB (Flicker frequency: 30 Hz AC/DC 1.2% (-50 dB sine wave))
- ±0.5 dB (Flicker frequency: 30 Hz AC/DC 1.2% (-50 dB sine wave))

### Repeatability
- ±0.004 for white
- ±0.004 for white
- ±0.004 for white

### Accuracy *3
- ±0.1 dB (Flicker frequency: 30 Hz AC/DC 1.2% (-50 dB sine wave))
- ±0.1 dB (Flicker frequency: 30 Hz AC/DC 1.2% (-50 dB sine wave))
- ±0.1 dB (Flicker frequency: 30 Hz AC/DC 1.2% (-50 dB sine wave))

### Flicker JEITA *3
- 0.5 (0.3) times/sec.
- 0.5 (0.3) times/sec.
- 0.5 (0.3) times/sec.

### Flicker contrast
- -16(16) times/sec.
- -16(16) times/sec.
- -16(16) times/sec.

### Repeatability (2σ)
- 0.0500 to 0.0999 cd/m²
- 0.0150 to 0.2999 cd/m²
- 0.0150 to 0.2999 cd/m²

### Appearance range
- 0% or less with no condensation
- 0% or less with no condensation
- 0% or less with no condensation

### Repeatability (2σ) *1
- 0.0050 to 0.0999 cd/m²
- 0.0150 to 0.2999 cd/m²
- 0.0150 to 0.2999 cd/m²

### Accuracy *1
- ±0.002 for white
- ±0.002 for white
- ±0.002 for white

### Flicker frequency (Hₚ)*
- 20(16) times/sec.
- 20(16) times/sec.
- 20(16) times/sec.

### Specifications

<table>
<thead>
<tr>
<th>Display</th>
<th>Digital</th>
<th>Analog</th>
</tr>
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<tr>
<td>LED</td>
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<td>Analog</td>
</tr>
<tr>
<td>ΔxyLV, RGB analyze, XYZ, u’,v’L, V</td>
<td>ΔxyLV, T, u’,v’L, RGB analyze, XYZ, u’,v’L, Flicker (Contrast method) *3</td>
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### Lighting control methods
- LED Universal Measuring
- LED Flicker Measuring

### Dimensions (Units : mm)

<table>
<thead>
<tr>
<th>Main Body</th>
<th>LED Universal Measuring ±27 Probe</th>
<th>LED Universal Measuring ±10 Probe</th>
</tr>
</thead>
<tbody>
<tr>
<td>1027</td>
<td>340</td>
<td>494x236 mm / 530 g</td>
</tr>
<tr>
<td>87</td>
<td>32</td>
<td>349x236 mm / 530 g</td>
</tr>
<tr>
<td>127</td>
<td>44</td>
<td>349x236 mm / 530 g</td>
</tr>
</tbody>
</table>

### Notes
- )*1 The chromaticity and luminance are measured under Konica Minolta’s condition (standard LCD 6500K, 9300K is used). *2) The luminance for monochrome is measured when the reading of luminance for white is 120 cd/m².
- )*3 Measurement of flicker (JEITA) method is supported by D65 software. *4 Measuring probe connected to probe connector P1 only. used USB-based RS-232C baud rate (38400 bps) *5 Measured by Konica Minolta’s PC (P3-600 M)

### Certification

Certificate No: UNR 06060000107301 JQA-EC02-4614 Date: March 12, 1997

**Konica Minolta, Inc.**

Konica Minolta Sensing America Inc.
New Jersey, U.S.A.

Phone: +1-877-473-2658 (in USA) 201-236-6300 (outside USA)
Fax: +1-201-785-2480

Konica Minolta Sensing Europe B.V.

German Office

Phone: +49 (0) 89 4367 1549
Fax: +49 (0) 89 4367 1548

French Office

Phone: +33 (0) 1 87 87 70 79
Fax: +33 (0) 1 87 87 70 01

UK Office

Phone: +44 1905 67 4790
Fax: +44 1905 67 4799

Estonian Office

Phone: +372 448 9800
Fax: +372 448 9801

Italian Office

Phone: +39 04 37 93 9461
Fax: +39 04 37 93 9460

Norwegian Office

Phone: +47 21 79 94 61
Fax: +47 21 79 94 60

Russian Office

Phone: +7 495 693 25 00
Fax: +7 495 693 25 01

Turkish Office

Phone: +90 212 576 25 56
Fax: +90 212 576 25 55

Konica Minolta (CHINA) Investment Ltd.

SE Sales Division

Phone: +86-21-5489 0030
Fax: +86-21-5489 0029

Beijing Office

Phone: +86-10-6221 1551
Fax: +86-10-6221 1550

Shanghai Office

Phone: +86-21-5489 0022
Fax: +86-21-5489 0021

Guangzhou Office

Phone: +86-20-3826 4220
Fax: +86-20-3826 4221

Chongqing Office

Phone: +86-23-6775 6789
Fax: +86-23-6775 6788

Hangzhou Office

Phone: +86-571-8886 1879
Fax: +86-571-8886 1878

Qingdao Office

Phone: +86-656-5320
Fax: +86-656-5319

Hubei, China

Phone: +86-27-6546 9942
Fax: +86-27-6546 9941

Singapore

Phone: +65 6563-9597
Fax: +65 6563-9575

Konica Minolta Sensing Singapore Pte Ltd.

Goyang-si, Korea

Phone: +82 (0) 31-955-4768
Fax: +82 (0) 31-955-4769

Konica Minolta Sensing Korea Co., Ltd.

Address: and telephone/fax numbers are subject to change without notice. For the latest contact information, please refer to the KDK/JCA Minolta Worldwide Website page.

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